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into a fence post. A number of excellent photographic views accompany this report.

R. DEC. WARD.
HARVARD UNIVERSITY.

SCIENTIFIC NOTES AND NEWS.

ANNUAL REPORT OF THE GEOLOGICAL SURVEY.

THE Fifteenth Annual Report of the United States Geological Survey has just been delivered by the Public Printer. It is a handsome volume of 755 pages and 48 plates, and contains, besides the administrative reports of the Director himself and of chiefs in charge of work, the following special papers :

'Preliminary Report on the Geology of the Common Roads of the United States,' by Prof. N. S. Shaler; 'The Potomac Formation,' by Prof. L. F. Ward; 'Sketch of the Geology of the San Francisco Peninsula,' by Andrew C. Lawson; 'Preliminary Report on the Marquette Iron-bearing District of Michigan,' by Prof. C. R. Van Hise, W. S. Bayley and H. L. Smyth; and 'The Origin and Relation of Central Maryland Granites,' by C. R. Keyes, with an 'Introduction on the General Relations of the Granitic Rocks in the Middle Atlantic Piedmont Plateau,' by the late Prof. G. H. Williams.

From these titles it is evident that the paper of most popular interest is the first one, on roads, by the versatile Harvard professor. He treats of the history of American roads, the methods of using stone in road-building, the relative value of road stones, their distribution, sources of supply, etc.; and thus makes a timely contribution to a subject which is receiving special attention in all parts of the country.

This is the last report made by Major J. W. Powell as Director of the Survey, who until recently has had charge of the work, under different organizations, for twenty-five years.

FISH CULTURE.

IN a lecture on fish culture before the Royal Institution of Great Britain, Mr. J. J. Armitstead, of the Royal Commission on Tweed and Solway Fisheries, thus compares the methods used in Great Britain and the United States :

The hatching apparatus which is now chiefly used in England consists of a long box, the water flowing in at one end protected by a water board or break water, which is simply to break the current and prevent it from washing away the eggs which are placed in the box. It also diverts the current and sends it down to the bottom of the box. The water passes underneath and passes out at a higher level, where we have a screen of perforated metal to prevent the escape of the little fish, and in this box is placed the hatching apparatus proper, that is, the trays or grilles upon which the ova are deposited. The grilles now in use are made of glass. We found, after trying a variety of substances, that glass is the best of anything. It gives off nothing. Wood and metal we know corrode in water, and in some waters some metals corrode very much, and a great deal of loss has been suffered by some who have used metallic trays for the purposes of incubation. The Americans like to do things, as we know, on a wholesale scale, and, not content with putting a layer of eggs upon the apparatus, they fill a basket, as they call it, half full of eggs. Then they send a current of water welling up from underneath, and of course the effect is that it flows through amongst the eggs, and they find that in due time they hatch. I have made very careful inquiries with regard to the result of the hatching of ova in this way, and I have found that the Americans are quite prepared to admit that they had a larger percentage of mortality in their metal baskets or trays than they had when they used glass grilles. They said, "We have discarded glass grilles long ago. They are too expensive." And they made use of other excuses. But, however, we find in practice that we can get far better results from these glass grilles, because, as I have said, there is nothing to contaminate the ova or do them injury. The trout eggs absorb any metallic matter which may be in the water, and become so saturated with it in course of time as to be very seriously injured. They may not be absolutely killed at the time, but it has been found that, although there is only a slightly increased mortality in hatching upon the metal, there is a greater mortality amongst the fish afterwards. They

do not live to grow up in the same way as they do when they are hatched on the glass.

RECENT CHEMICAL PROGRESS.

PROF. DEWAR lectured before the Royal Institution on April 16th, on Recent Chemical Progress. According to the report in the *London Times* Prof. Dewar dwelt especially on the great future opened out to synthetical chemistry by the employment of the température of the electric arc. Some of the most interesting results had been obtained from the electric furnace by the French chemist, M. Moissan, in the shape of carbides, stable bodies produced by the combination at high temperatures of carbon with various metals. Many of the carbides were decomposed by water, the hydrogen of the water combining with the carbon to form hydrocarbons. Thus with water some carbides, such as that of calcium, gave acetylene; others, like that of aluminium, gave marsh gas, while others again gave these and other gases, and what was most wonderful, liquid petroleums. It was a curions fact that many years ago Professor Mendeleef speculated that the only reason for the immense localization of petroleum at Baku was that it was being generated there by the action of water on carbides. His idea was rather smiled at then, but now it is his turn to smile. When acetylene was heated to a dull red heat it was polymerized to benzene. Benzene was the basis of all the new modern colors, and thus by three direct stages we were able to reach the nucleus of all the colors hitherto manufactured from coal-tar products. First there was the combination of lime and coke in the electric furnace; second, the decomposition of the carbide thus formed by water; and third, the transformation into benzene of the resulting acetylene by means of heat. Professor Dewar concluded by briefly discussing some of the properties of acetylene, explaining, among other things, the cause of its extraordinarily great luminosity as due to its peculiar endothermic structure.

THE MARINE BIOLOGICAL LABORATORY.

THE announcement of the Laboratory of Woodsholl for 1896 shows that several changes

have been made. Prof. Bumpus has resigned the position of assistant director, which has been filled by the appointment of Prof. James I. Peck, of Williams College, who also has charge of the instruction in zoölogy. Dr. Setchell, owing to his removal to the University of California, has given up charge of the botanical department, which has been undertaken by Prof. Macfarlane, of the University of Pennsylvania. The officers having charge of original research in zoölogy include Profs. Howard Ayers, University of the State of Missouri; E. G. Conklin, University of Pennsylvania; W. A. Locy, Northwestern University; and M. M. Metcalf, the Woman's College of Baltimore. Prof. Whitman has charge of the work in embryology with the assistance of Dr. Lillie, of the University of Michigan, and Dr. Strong, of Columbia College.

The session of 1895 was unusually successful, the membership of the laboratory being 199, which was 65 in excess of the number in 1894, a regular increase having been maintained since the foundation of the laboratory in 1888. In 1895 there were 42 independent investigators at work and 21 carrying on research under supervision. In addition to the regular courses nineteen public lectures were given in 1895. The Marine Biological Laboratory is perhaps open to the criticism that the work is too much that of the laboratory and too little that of the naturalist, but this is only following the trend of biological science throughout the world. It is certain that nowhere else in America can biological research be undertaken with such pleasant and stimulating surroundings.

THE ZOÖLOGICAL SOCIETY OF LONDON.

ACCORDING to the *London Times*, the sixtieth anniversary meeting of the Society was held on April 29th. The report of the Council stated that the number of Fellows on January 1, 1896, was 3,027, showing a net increase of 55 members during the year. The number of new Fellows that joined the Society in 1895 was 197, which was the largest number of elections that had taken place in any year since 1877. The total receipts of the Society for 1895 amounted to £26,958 9s. 1d., showing an increase of £1,851 8s. 6d., as com-

pared with the previous year. The ordinary expenditure in 1895 had amounted to £23,460 16s. 10d., being £155 6s. 9d. less than that of the previous year. Besides this a sum of £1,649 19s. 1d. had been charged to extraordinary expenditure. Of this sum £1,149 19s. 1d. had been devoted to the new scheme of drainage for the society's gardens, and £500 to the special acquisition of a giraffe for the menagerie. Besides this expenditure, £1,000 had been devoted to paying off the last remaining portion of the mortgage debt on the Society's freehold premises, which were now valued at £25,000 and were absolutely free and unencumbered. A second sum of £1,000 had been transferred to a deposit account. After these payments a balance £1,391 1s. 2d. had been carried forward to the credit of the present year. A new edition of the list of animals in the Society's collection, of which the last (the 8th) was published in 1883, had been prepared under the direction of the Secretary. It would, it was hoped, be ready for issue before the close of the present year. A large number of accessions to the library were reported. The number of visitors to the gardens in 1895 had been 665,326, which was greater than it had been in any year during the past ten years. The number of animals in the Society's collection on December 31st last was 2,369, of which 768 were mammals, 1,267 birds and 334 reptiles. About 28 species of mammals, 22 of birds and one of reptiles had bred in the gardens during the summer of 1895. General the Hon. Sir. Percy Fielding, Prof. Alfred Newton, Sir Thomas Paine, Mr. E. Lort Phillips and Lord Walsingham were elected into the Council in the place of the retiring members. Sir William H. Fowler was re-elected President; Mr. Charles Drummond, Treasurer, and Mr. Philip Lutley Selater, Secretary for the ensuing year.

GENERAL.

DR. N. L. BRITTON has been elected director of the New York Botanical Gardens and will resign the chair of botany in Columbia University, though he will probably remain connected with the University as professor emeritus. Prof. Lucien M. Underwood will be called to the chair of botany in Columbia University.

THE Smithsonian Institution has received from the State Department notification that the Fourth Congress of Criminal Anthropology is to be held at Geneva, Switzerland, under the auspices of the Swiss government, from August 24th to 29th of the present year. The government of Switzerland has, through its minister in Washington, invited the United States to send a representative to the Congress. Dr. Thomas Wilson, curator of the Department of Pre-historic Anthropology in the National Museum, has attended two of these Congresses, and prepared an elaborate report on the Second Congress, held at Paris in August, 1889. This was published in the Smithsonian report for 1890. It has not yet been decided whether or not the United States will send a delegate this year to Geneva.

AN effort is now under way in connection with the National Educational Association to bring about greater interest in the *teaching* of science than has hitherto been shown by American botanists, zoölogists, chemists, physicists, etc. The new Department of Natural Science Instruction is intended to bring together the teachers of the natural sciences who are interested in science as a means of culture and to stimulate thought and discussion as to how this end may best be obtained. What rôle should botany, zoölogy, chemistry, physics, etc., play in the mental development of man? In what way may the study of plants, animals, chemical compounds and physical forces be made an efficient factor in a man's mental training? When and how shall such study be made a part of a man's training? These are some of the questions which will be discussed in the Department of Natural Science Instruction in the Buffalo meeting of the National Educational Association on Thursday and Friday afternoons (July 9 and 10), led by Profs. Carhart (University of Michigan), Freer (University of Michigan), Coulter (University of Chicago), and President Jordan (Leland Stanford University). Prof. Charles E. Bessey, of the University of Nebraska, Lincoln, is President of the department, and Prof. Charles S. Palmer, of the University of Colorado, Boulder, is the Secretary.

THE Flower Astronomical Observatory of the University of Pennsylvania is now completed and preparations are being made for its dedication. Prof. Charles L. Doolittle now occupies the director's residence and with the instructor in astronomy, Mr. H. B. Evans, has commenced preliminary work. In addition to the Flower Observatory, it is proposed to erect a small working observatory on the University grounds in West Philadelphia. The building will be equipped with a transit instrument, zenith telescope and a 4-inch equatorial, which have been presented to the University by Mr. Horace Howard Furness, Jr.

THE University of Buda-Pesth in connection with its millenium celebration will confer the honorary degree of doctor of medicine on Dr. John S. Billings.

AT a recent meeting of the Board of Managers of the New York Botanical Garden, Judge Addison Brown submitted a report from the committee on plans which stated that plans for the museum building are being prepared by ten competing firms of New York architects. Two hundred and fifty-three persons, paying \$10 a year each, have qualified for annual membership.

MR. T. D. A. COCKERELL, Las Cruces, New Mexico, proposes to found a biological station, and a beginning will be made this summer, if students can be found. There is in New Mexico a great abundance of new and interesting forms of life, especially among the insects, and many general problems, such as those of the life zones, can also be studied to great advantage.

THE Metric System, will be discussed by Herbert Spencer in a series of letters to appear in Appleton's *Popular Science Monthly* for June. Mr. Spencer opposes the further spread of the system, and points out the advantages of a duodecimal over a decimal system.

WE learn from the English papers that the following fifteen candidates have been recommended by the Council for election to the Royal Society: Sir George Sydenham Clarke, known for his publications on projectiles and fortifications; Dr. J. Norman Collie, Assistant Pro-

fessor of Chemistry; in University College, London; Arthur Matthew Weld Downing, Superintendent of the *Nautical Almanac*; Francis Elgar, Professor of Naval Architecture and Marine Engineering in the University of Glasgow; Andrew Gray, Professor of Physics in University College of North Wales; Dr. George Jennings Hinde, geologist and paleontologist; Henry Alexander Miers, known for his researches in mineralogy; Frederick Walker Mott, Lecturer in Physiology in Charing Cross Hospital; Dr. John Murray, editor of the *Challenger* publications; Karl Pearson, Professor of Mathematics and Mechanics at University College, London; Thomas Roscoe Rede Stebbing, known for his researches in natural history; Charles Stewart, Hunterian Professor of Human and Comparative Anatomy in the Royal College of Surgeons; William E. Wilson, astronomer; Horace Bolingbroke Woodward, of the Geological Survey of England and Wales, and William Palmer Wynne, Assistant Professor of Chemistry in the Royal College of Science, South Kensington.

THE first of the two annual *Converzationes* of the Royal Society was held on May 6th. The exhibits included X-ray photographs by Messrs. Swinton, Jackson and Sydney Rowland. Mr. F. E. Ives exhibited his method of color photography and Prof. Mendola gave a demonstration by means of the electric lantern of Prof. Lippmann's color photographs by the inferential method. Prof. Worthington showed photographs of the splashes produced by a falling drop of water taken with the electric spark, the exposure being less than three millionths of a second. A method was shown by which two or three thousand copies of a photograph can be printed, developed and fixed in an hour. The exhibits seem to have been largely in photography, but in addition Prof. Dewar repeated his experiments with liquid air, and the new binocular field glasses and stereo-telescopes of Mr. Carl Zeiss were exhibited.

AT the recent annual meeting of the members of the Royal Institution of Great Britain, the report of the committee stated that the property of the Institution now amounts to more than £100,000. 63 lectures and 19 evening discourses

were given in 1895. The Duke of Norfolk was elected president for the ensuing year.

D. APPLETON & Co. will publish shortly, as a new volume in the International Scientific Series, *Ice Work, Present and Past*, by Dr. T. G. Bonney, professor in University College, London. It is said that in his work Prof. Bonney will give special prominence to those facts of glacial geology on which all inferences must be founded. After setting forth the facts shown in various regions, he will give the various interpretations which have been proposed, adding his comments and criticisms. He will also explain a method by which he believes we can approximate to the temperature at various places during the Glacial epoch, and the different explanations of this general refrigeration will be stated and briefly discussed.

IT is reported in the daily papers that in order to carry out still further certain recommendations of the recent committee on prisons, the directors of convict prisons in Great Britain have decided that, with a view to raise the moral tone and relieve the monotony of the life of convicts undergoing long sentences of penal servitude, lectures on scientific and interesting subjects shall be periodically given, and arrangements are in progress for giving early effect to this innovation.

IT is stated in the New York *Evening Post* that the British Government has determined to send two naturalists to Alaska to make a study of the causes of the mortality of the seals. Thirty thousand pups were found dead on the Pribylow Islands last year, due, it is said, to starvation following pelagic sealing. That the report of these naturalists may not be *ex parte*, and therefore inconclusive to the minds of the American people, it is desired that at least one thoroughly qualified American shall accompany them.

THE Astor Library will hereafter be open till 6 o'clock p. m. Electric light is being introduced into the library in order that the alcoves may be better lighted, and this will probably lead to the opening of the library in the evening. When the new consolidated library on Bryant Park Square has been built,

it is intended to open the library on Sundays as well as in the evenings, and part of the books will be allowed to be taken from the building.

THE death is announced of Dr. Adelbert Krüger, director of the observatory at Kiel and editor of *Astronomische Nachrichten*. Krüger was born in 1832 and studied under and acted as assistant to Argelander, whose daughter he married. In 1862 Krüger was made director of the Observatory at Helsingfors; in 1875 he removed to Gotha and in 1879 succeeded Peters at Kiel.

THE annual field meeting of the National Geographic Society was held at Charlottesville, Virginia, on Saturday, May 16. The principal exercises of the day were held at Monticello, the home of Jefferson. This was followed by a visit to the University of Virginia and other points of interest in Charlottesville. According to the program an address of welcome was made by Mayor Patton, of Charlottesville, and responded to by President Hubbard. An address by Dr. Randolph, rector of the University of Virginia, was responded to by General A. W. Greely. Addresses were also made by Postmaster-General Wilson, on 'Jefferson at Home'; by Dr. McGee, on the 'Physiography of the Charlottesville Region'; by Dr. Goode, on 'Old Albemarle in the Revolutionary Period,' and by Prof. Thornton on 'Spottiswood's Journey Across the Blue Ridge.'

THE civil service examinations in New York and elsewhere are, it seems, often passed by proxy, and the Civil Service Commission following Mr. Francis Galton's recommendation, which they seem to have learned through a story of 'Mark Twain,' have resolved that, for the purpose of identification, candidates in examination for the position of fireman and policeman be required to make an imprint of their right and left thumbs upon paper.

MM. AUGUSTE GERARDIN and Maurice Nicloux report to the Paris Academy a method for measuring smells in the air due to organic vapors. By means of incandescent platinum they burn out the organic vapors and determine the decrease in volume. They have thus been able to find, for example, that the smell of

violets occupies twice as much volume as the smell of camphor. They think the method can be employed to test the hygienic condition of the air of cities.

AT the annual business meeting of the National Geographic Society the following six members of the Board of Managers were elected for the next three years: Charles J. Bell, G. K. Gilbert, D. T. Day, W. H. Dall, H. G. Ogden and C. W. Dabney.

IT is announced that the Toronto meeting of the British Association in 1897 will be opened on August 18th.

IN a letter to the Secretary of the American Metrological Society, Mr. Horace Andrews, City Engineer of Albany, states that while a change to the metric system would probably occasion more awkwardness in an engineer's office than anywhere else, yet he is in favor of change. He calls attention to the fact that in many old deeds and old maps the 'Ryland' foot and rod were used; this was probably a 'Rhineland' foot, its length being 1.0345 English feet.

IT is stated in *New York Evening Post* that Dr. William W. Jacques, an electrician of Boston, claims to have solved the problem of obtaining electrical energy from coal direct. As described by himself, in his application for a patent, he has discovered that "if oxygen, whether pure or diluted as in air, be caused to combine with carbon or carbonaceous materials, not directly, as in combustion, but through an intervening electrolyte, the potential energy of the carbon may be converted directly into electrical energy instead of into heat." His electrolyte is fused caustic soda, into which he places a stick of carbon, the oxygen being supplied by pumping in the air.

ACCORDING to *Nature*, a fine series of photographs of flying bullets, both in free air and in different stages of penetrating through a pane of glass, have been taken in Italy by Dr. Q. Majorana Calatabiano and Dr. A. Fontana, of the Italian Artillery. The apparatus described is a modification of that employed by Prof. C. V. Boys, and these photographs might, perhaps, more correctly

be described as skiagraphs, since they are shadow-pictures produced on the photographic plate by the light from an electric spark produced by the discharge of a condenser. The chief peculiarity of the present figures is that, in addition to the anterior wave produced by the advance of the aerial disturbance, they exhibit dark striae just in front of the projectile—a result not previously observed, and which the authors account for by supposing that the sudden compression of the air causes condensation of moisture producing an opaque cloud. In support of this theory, it is stated that the experiments were performed in a moist atmosphere. This blurred appearance is very similar to that which would be produced by the sparks arising from an oscillatory discharge of the condenser, but the careful precautions adopted by the experimenters to prevent any secondary discharge negative this explanation.

DR. CHARLES H. JUDD, who has recently been appointed instructor in psychology in Wesleyan University, is engaged in translating Prof. Wundt's recently issued *Grundriss der Psychologie* with the coöperation and under the direction of the author.

WE take the following items from the May number of *Natural Science*: "Dr. K. Lauterbach, Mr. Tappenbeck and Dr. Kirsting are leading an expedition to the Hinterland of New Guinea." "Dr. Nils Holst, the Swedish geologist, is to travel for a year in West Australia under the auspices of the Anglo-Scandinavian Exploration Company." "The 'Faraday' has returned from the Amazons, bringing with her Messrs. Austen and Pickard Cambridge, who have amassed a fine collection, chiefly of Arthropoda, and including several spiders' nests. These will go to the British Museum (Natural History). Some interesting bionomic observations have been made." "In connection with Andrée's balloon exhibition to the North Pole, it is hoped to send a zoölogical expedition, under the direction of G. Grönberg, lecturer at Stockholm University, to the Norsk-öar, near Spitzbergen, from which islands the ascent is to be made. These islands have long been known as one of the richest zoölogical localities in this region. A Polish contingent

to the expedition is being planned by Dr. Roszkowski and Prince O. Hajdukiewicz, who are both studying at Stockholm. If thirteen volunteers come forward, it is proposed to hire a steamer to accompany the 'Virgo,' which leaves Gothenburg with Andrée on May 1. After visiting Spitzbergen and the Norsk-öar, this steamer will return to the north of Norway to observe the solar eclipse."

AN editorial article in the London *Journal of Education* calls attention to the lack of psychological laboratories in England as compared with America, and emphasizes the fact by spelling 'psychological' 'pyschological' throughout.

UNIVERSITY AND EDUCATIONAL NEWS.

MR. THOMAS MCKEAN has offered to give \$100,000 to the University of Pennsylvania upon condition that \$1,000,000 be collected. Mr. McKean, who is a trustee and an alumnus of the University, gave \$50,000 about a year ago.

MR. CHARLES M. DALTON has given the Massachusetts Institute of Technology \$5,000 for a scholarship in chemistry for graduate students. Preference will be given to those undertaking chemical research applicable to textile fabrics.

REAL estate and securities valued at \$215,000 have been presented to the Northwestern University by William Deering, of Evanston, who had previously given the University about \$200,000.

MR. AND MISS HOUGHTON, son and daughter of the late William S. Houghton, of Boston, trustee of Wellesley College, have given \$100,000 for a chapel to be erected in memory of their father.

THE fourth summer meeting, conducted by the American Society for the Extension of University Teaching, will be held in the buildings of the University of Pennsylvania, Philadelphia, July 6-31, 1896. Botany, chemistry and psychology are especially well represented, five courses being offered in botany and four each in chemistry and in psychology. The lecturers include Dr. B. L. Robinson, Dr. John M. Mac-

farlane, Dr. J. W. Harshberger, Prof. W. P. Wilson, Prof. Byron D. Halsted, Dr. M. E. Pennington, Prof. William Freer, Prof. W. O. Atwater, Dr. F. G. Benedict and Prof. Lightner Witmer.

DISCUSSION AND CORRESPONDENCE.

THE SIGNIFICANCE OF ANOMALIES.

AT a recent meeting of the Boston Society of Natural History I remarked on the want of a satisfactory explanation of certain anomalies that it is the fashion to crudely class as rever-
sions. I referred to the occasional appearance in man of some peculiarity of a lower form, which is in no conceivable line of human descent. I pointed out further that these anomalies were not only very numerous, but included features of the most diverse groups. To account for them by inheritance we must assume that they existed in a common ancestor of man and of the animal in which they are normal, with the astounding consequence that this primitive form, instead of being comparatively simple, must have been a perfect museum of anatomical curios, which is directly contrary to the principle of evolution. I failed to receive any information, and indeed did not expect any, for I have talked on this question with many, and have written and spoken publicly on it before. Testut's great work on muscular anomalies is a case in point; the author seems to be perfectly satisfied that he has accounted for a variation if he has shown it to be normal in some animal, no matter which. If I remember rightly, Gegenbaur, at the time, commented on this point, hinting that Testut's explanation needed to be explained. Within a few years the difficulty has been more frankly acknowledged. Thus in the Robert Boyle lecture delivered two years ago, Prof. Macalister said: "I cannot see that when one finds in the limb of a kangaroo or of a sloth, or in the face of a horse, a certain form of muscle like one which occurs as an anomaly in man, we must therefore conclude that its human occurrence must necessarily be due to atavism. Indeed the more I survey the catalogue of such parts the more I am impressed with the failure of the method as a scientific mode of accounting for these anomalies, while at the same time I am filled with admiration at